

ABSTRACT

A composite polymer electrolyte membrane is formed from a first polymer electrolyte comprising a sulfonated polyarylene polymer and a second polymer electrolyte comprising another hydrocarbon polymer electrolyte. In the first polymer electrolyte, 2-70 mol% constitutes an aromatic compound unit with an electron-attractive group in its principal chain, while 30-98 mol% constitutes an aromatic compound unit without an electron-attractive group in its principal chain. The second polymer electrolyte is a sulfonated polyether or sulfonated polysulfide polymer electrolyte. The composite polymer electrolyte membrane is formed from a matrix comprising the first polymer electrolyte selected from among sulfonated polyarylene polymers and having an ion exchange capacity in excess of 1.5 meq/g but less than 3.0 meq/g, which is supported on a reinforcement comprising the second polymer electrolyte having an ion exchange capacity in excess of 0.5 meq/g but less than 1.5 meq/g. The polymer electrolyte membrane comprises a polyarylene polymer sulfonated so that the Q value is within the range 0.09-0.18 C/cm<sup>2</sup>.